TUGAS AKHIR

RANCANG BANGUN MESIN PENETAS TELUR DENGAN SISTEM MONITORING BERBASIS RASPBERRY PI Zero W

Diajukan guna melengkapi sebagian syarat dalam mencapai gelar Sarjana Strata Satu (S1)

Disusun Oleh:
Nama : Adhi Nugroho
N.I.M : 414115120131
Pembimbing : Muhammad Hafizd Ibnu Hajar, ST.,M.Sc.

PROGRAM STUDI TEKNIK ELEKTRO
FAKULTAS TEKNIK
UNIVERSITAS MERCUBUANA
JAKARTA
2020

https://lib.mercubuana.ac.id/
LEMBAR PENGESAHAN

RANCANG BANGUN MESIN PENETAS TELUR DENGAN SISTEM MONITORING BERBASIS RASPBERRY PI Zero W

UNIVERSITAS MERCUBUANA

Disusun Oleh:
Nama : Adhi Nugroho
Nim : 41415120131
Program Studi : Teknik Elektro

Mengetahui,
Pembimbing Tugas Akhir

(Muhammad Hafizd Ibru Hajar, ST.M.Sc)

Kaprodi Teknik Elektro

(Koordinator Tugas Akhir

(Dr. Setiyo Budiyanto, ST, MT)

(Muhammad Hafizd Ibru Hajar, ST.M.Sc)

https://lib.mercubuana.ac.id/
HALAMAN PERNYATAAN

Yang bertanda tangan dibawah ini :
Nama : Adhi Nugroho
N.I.M  : 41415120131
Jurusan : Teknik Elektro
Fakultas : Teknik
Judul : Rancang Bangun Mesin Penetas Telur Dengan Sistem Monitoring Berbasis Raspberry Pi Zero W

Dengan ini menyatakan bahwa hasil penulisan Laporan Tugas Akhir yang telah saya buat ini merupakan hasil karya sendiri. Apabila ternyata di kemudian hari penulisan Laporan Tugas Akhir ini merupakan hasil plagiat atau penjiplakan terhadap karya orang lain, maka saya bersedia mempertanggungjawabkan sekali guns menerima sanksi berdasarkan aturan di Universitas Mercu Buana.

Demikian, pernyataan ini saya buat dalam keadaan sadar dan tidak ada paksan.

UNIVERSITAS MERCU BUANA

Jakarta, 13 Mei 2020

Adhi Nugroho
NIM. 41415120131
DAFTAR ISI
HALAMAN JUDUL ................................................................................. i
HALAMAN PENGESAHAN ................................................................. ii
HALAMAN PERNYATAAN ................................................................. iii
ABSTRAK .......................................................................................... iv
ABSTRACT ....................................................................................... v
DAFTAR ISI ...................................................................................... vi
DAFTAR GAMBAR .............................................................................. viii
DAFTAR TABEL .................................................................................. x

BAB I PENDAHULUAN
1.1 Latar Belakang .......................................................................... 1
1.2 Rumusan Masalah ................................................................. 2
1.3 Tujuan Penelitian .................................................................. 3
1.4 Batasan Masalah ..................................................................... 3
1.5 Metodologi Penelitian .......................................................... 3
1.6 Sistematika Penulisan ............................................................ 4

BAB II LANDASAN TEORI
2.1 Tinjauan Pustaka ..................................................................... 6
2.2 Raspberry Pi ............................................................................ 10
          2.2.1 Komunikasi GPIO General Purpose Input Output .......... 12
          2.2.2 VNC Viewer ............................................................... 15
          2.2.3 Cara Download dan Instal VNC Viewer ..................... 16
          2.2.4 Open VNC Viewer .................................................... 19
          2.2.5 Advanced IP Scanner .................................................. 22
2.3 Bahasa Pemrograman ............................................................. 22
          2.3.1 Bahasa Pemrograman Python .................................... 23
2.4 Relay ....................................................................................... 24
          2.4.1 Cara Kerja Relay ........................................................ 25
2.4.2 Arti Pole dan Throw Pada Relay ........................................... 26
2.4.3 Fungsi – fungsi dan Aplikasi Pada Relay ............................ 27
2.5 Pengertian Umum Sensor .......................................................... 28
  2.5.1 DHT 22 ........................................................................ 28
2.6 Raspberry Pi Camera ............................................................. 29

BAB III PERANCANGAN ALAT & SISTEM
3.1 Blok Diagram Rancangan Sistem Kontrol ............................... 30
3.2 Perancangan Perangkat Keras (Hardware) ............................. 31
3.3 Diagram Alir Perancangan ..................................................... 32
3.4 Perancangan Perangkat Lunak (Software) .............................. 33
  3.4.1 Instalasi Sistem Operasi .................................................. 33

BAB IV HASIL DAN PEMBAHASAN
4.1 Hasil dan Perancangan ............................................................ 37
  4.1.1 Prosedur Pengujian ......................................................... 39
  4.1.2 Hasil Pengujian .............................................................. 39
  4.1.3 Analisa ........................................................................ 40
4.2 Pengujian Error Inkubator Aplikasi Kontrol Suhu .................. 40
  4.2.1 Prosedur Pengujian ......................................................... 42
  4.2.2 Analisa ........................................................................ 42
  4.2.3 Analisa Keseluruhan ..................................................... 50
4.3 Pembahasan Implementasi ..................................................... 51

BAB V PENUTUP
5.1 Kesimpulan .......................................................................... 52
5.2 Saran ..................................................................................... 53

DAFTAR PUSTAKA ....................................................................... 54

LAMPIRAN .................................................................................. 55
DAFTAR GAMBAR

Gambar 2.1 Board Raspberry Pi Zero W .......................................................... 12
Gambar 2.2 Komunikasi GPIO pada Raspberry Pi Zero W ......................... 13
Gambar 2.3 VNC Viewer logo ...................................................................... 16
Gambar 2.4 Tampilan Download Aplikasi VNC Viewer .............................. 16
Gambar 2.5 Tampilan Instal VNC Viewer step 1 ........................................ 17
Gambar 2.6 Tampilan Instal VNC Viewer step 2 ........................................ 17
Gambar 2.7 Tampilan Instal VNC Viewer step 3 ........................................ 18
Gambar 2.8 Tampilan Instal VNC Viewer step 4 ........................................ 19
Gambar 2.9 Tampilan Aplikasi VNC Viewer ............................................... 19
Gambar 2.10 Tampilan Jendela VNC Viewer ............................................. 20
Gambar 2.11 Tampilan Permintaan Password remote VNC Viewer .......... 21
Gambar 2.12 Tampilan Remote VNC Viewer ............................................ 21
Gambar 2.13 Tampilan Aplikasi IP Scanner ............................................... 22
Gambar 2.14 Icon IP Scanner ................................................................. 22
Gambar 2.15 Relay 8 Channel ................................................................. 25
Gambar 2.16 Struktur Sederhana Relay ..................................................... 25
Gambar 2.17 Jenis Relay Berdasarkan Pole & Throw ................................ 27
Gambar 2.18 Sensor DHT 22 .................................................................... 28
Gambar 2.19 Pi Camera V2 ..................................................................... 29
Gambar 3.1 Blok Diagram ......................................................................... 30
Gambar 3.2 Design Box Inkubator ............................................................. 32
Gambar 3.3 Perancangan Elektrikal ............................................................. 33
Gambar 3.4 Program Win32 Disk Imager ................................................... 34
Gambar 3.5 Konfigurasi awal Raspbian OS .............................................. 35
Gambar 3.6 Tampilan Awal Raspberry Pi .................................................. 35
Gambar 3.7 Flowchart Software ............................................................... 36
Gambar 3.8 Flowchart Keseluruhan ......................................................... 36
Gambar 4.1  Design Alat................................................................. 38
Gambar 4.2  Design Hardware Mikrokontroler ................................. 39
Gambar 4.3  Tampilan data 192.168.43.35/phpmyadmin......................... 40
Gambar 4.4  Tampilan record video .................................................. 40
Gambar 4.5  Tampilan monitoring suhu dan humidity .......................... 41
Gambar 4.6  Hasil Percobaan Kondisi Cuaca 1 setpoint Puyuh .......... 43
Gambar 4.7  Hasil Percobaan Kondisi Cuaca 1 setpoint Ayam .......... 44
Gambar 4.8  Hasil Percobaan Kondisi Cuaca 2 Perlakuan 1 setpoint Puyuh .. 44
Gambar 4.9  Hasil Percobaan Kondisi Cuaca 2 Perlakuan 2 setpoint Puyuh .. 45
Gambar 4.10  Hasil Percobaan Kondisi Cuaca 2 Perlakuan 1 setpoint Ayam. 46
Gambar 4.11  Hasil Percobaan Kondisi Cuaca 2 Perlakuan 2 setpoint Ayam. 46
Gambar 4.12  Hasil Percobaan Kondisi Cuaca 3 Perlakuan 1 setpoint Puyuh 47
Gambar 4.13  Hasil Percobaan Kondisi Cuaca 3 Perlakuan 2 setpoint Puyuh 48
Gambar 4.14  Hasil Percobaan Kondisi Cuaca 3 Perlakuan 1 setpoint Ayam. 49
Gambar 4.15  Hasil Percobaan Kondisi Cuaca 3 Perlakuan 2 setpoint Ayam. 49

https://lib.mercubuana.ac.id/
DAFTAR TABEL

Tabel 2.1  Beberapa Literatur Penelitian.......................................................... 7
Tabel 2.2  Spesifikasi Raspberry Pi Zero W..................................................... 11
Tabel 2.3  Pin Power Pada Header Raspberry Pi Zero W............................. 14
Tabel 4.1  Pengujian Sensor Suhu ................................................................. 40
Tabel 4.2  Pengujian Motor Stepper ............................................................... 41